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(54) **DIAMOND EARRING WITH WASHER**

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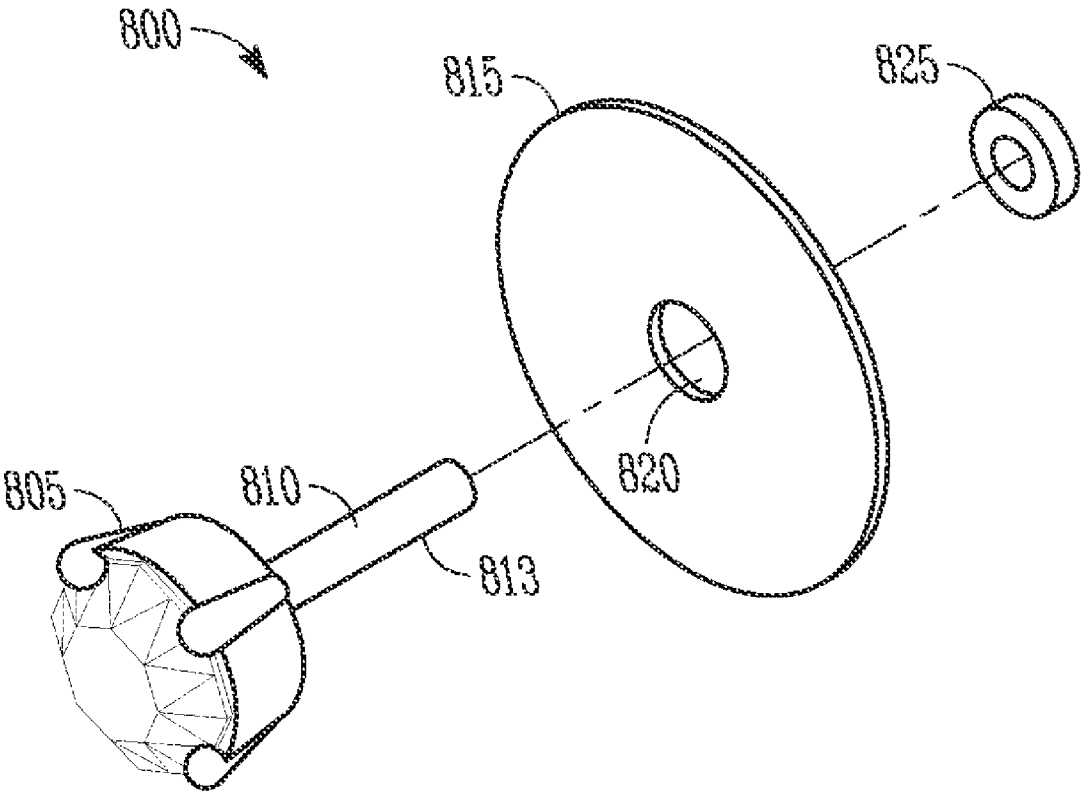
B23P 5/00	(2006.01)

(52) **U.S. Cl.** **63/12**; 29/10

(57) **ABSTRACT**

A post is formed of diamond with a gemstone integrally formed with the post. A washer formed of diamond has a hole for being supported by the post such that the washer is held between the gemstone and a body part when worn on the body part.



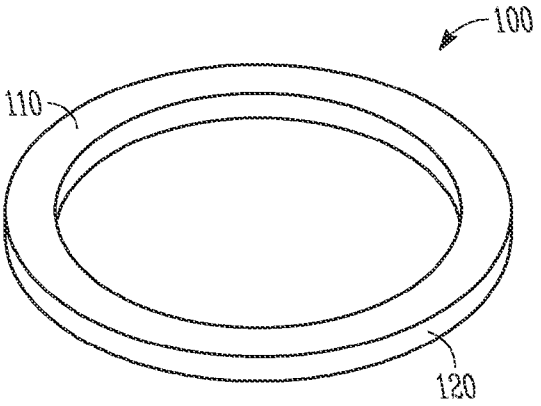


FIG. 1

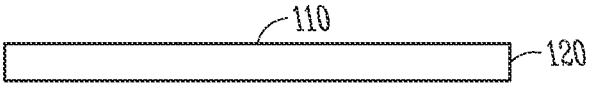


FIG. 2

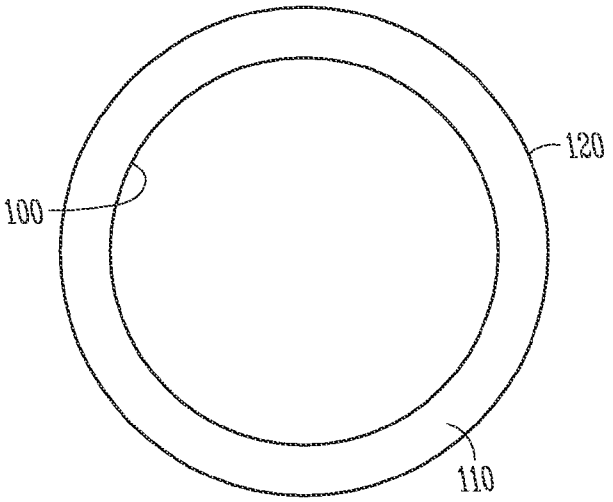


FIG. 3

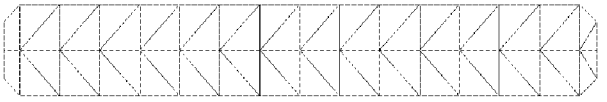


FIG. 4

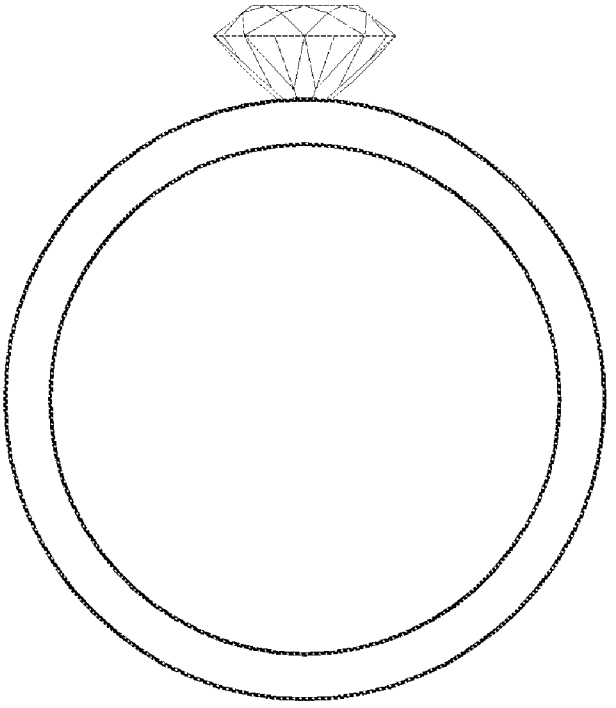


FIG. 5

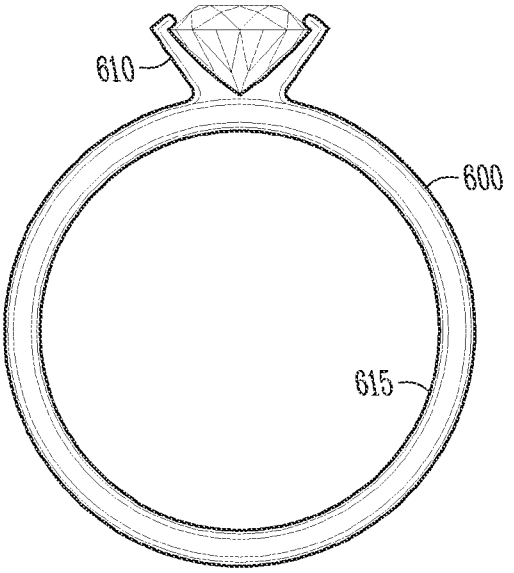


FIG. 6

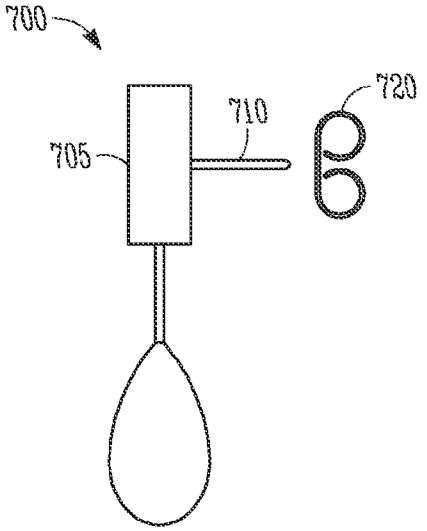


FIG. 7A

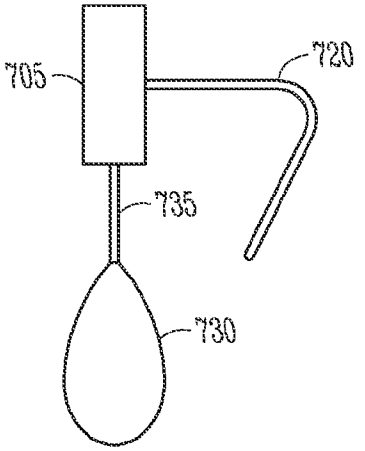


FIG. 7B

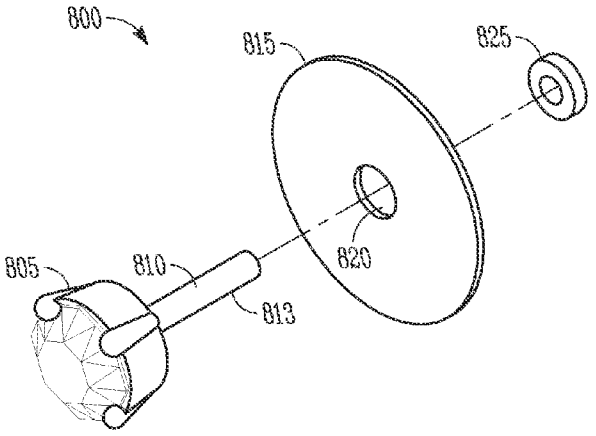


FIG. 8A

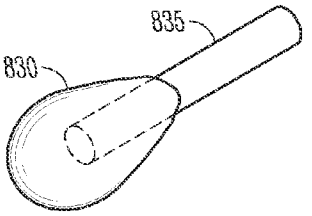


FIG. 8B

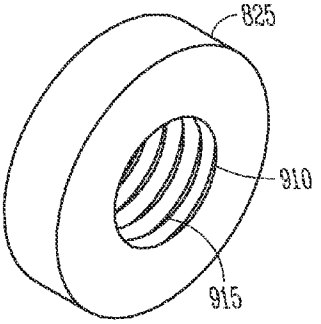


FIG. 9

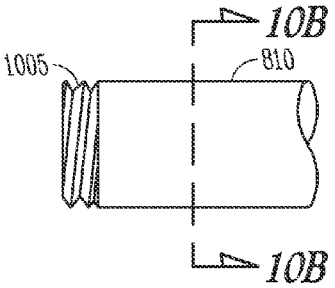


FIG. 10A

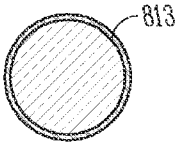


FIG. 10B

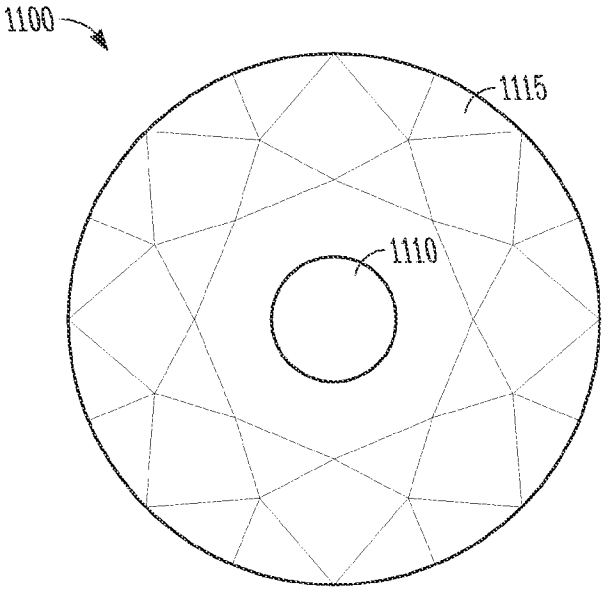


FIG. 11

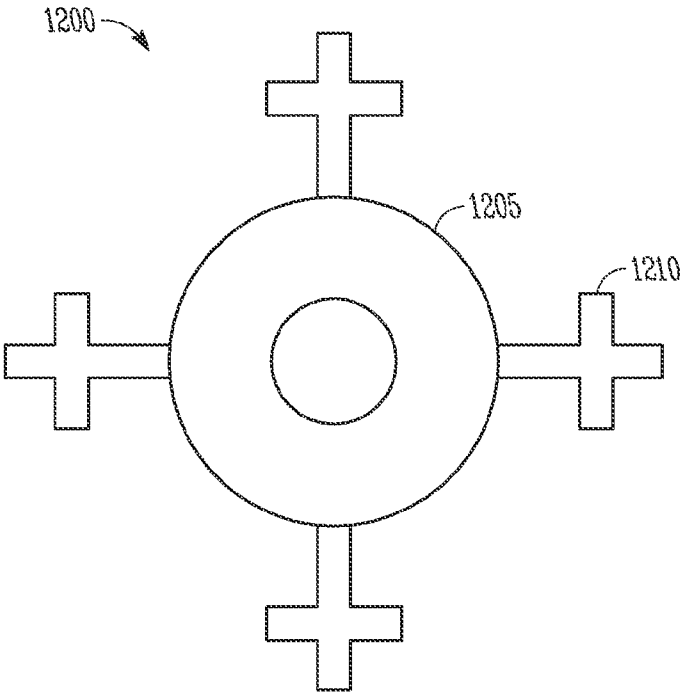


FIG. 12

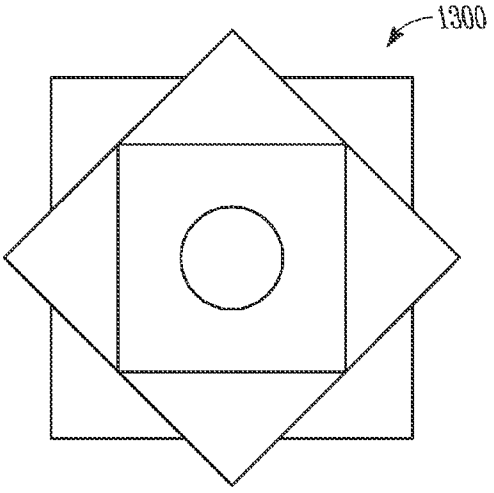


FIG. 13

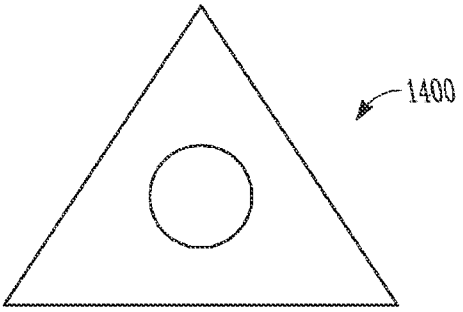


FIG. 14

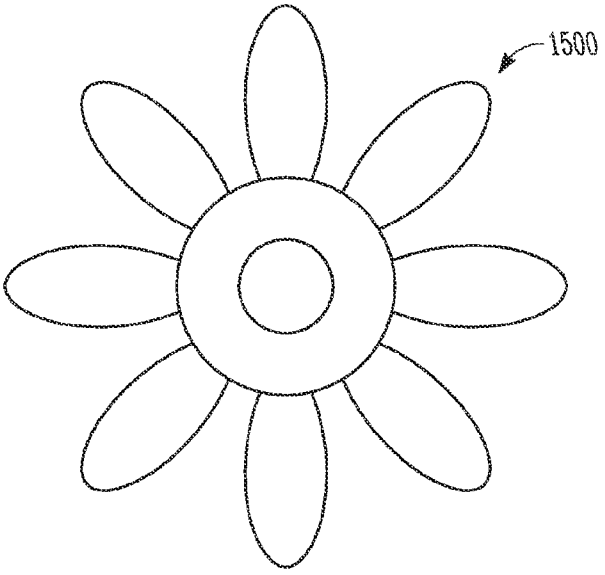


FIG. 15

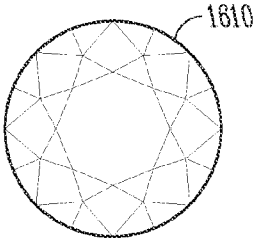


FIG. 16A

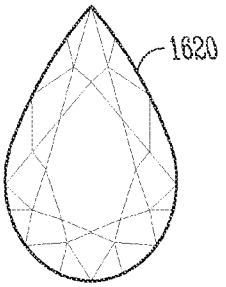


FIG. 16B

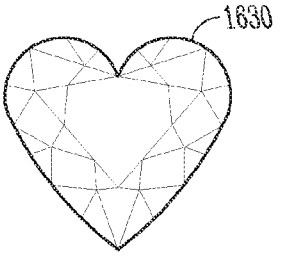


FIG. 16C

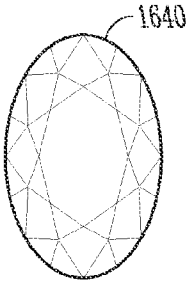


FIG. 16D

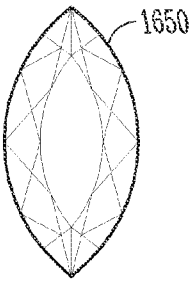


FIG. 16E

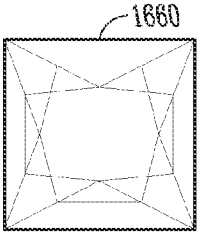


FIG. 16F

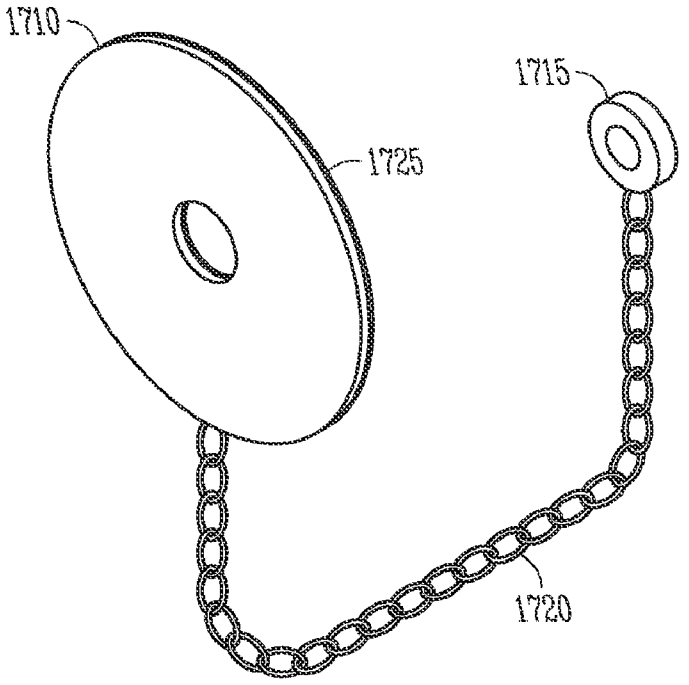


FIG. 17

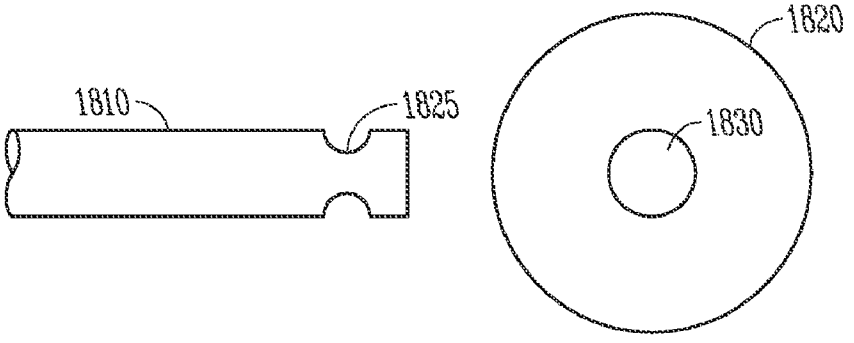


FIG. 18

DIAMOND EARRING WITH WASHER

FIELD

[0001] The present invention relates to the jewelry art, and specifically to jewelry made from a diamond.

BACKGROUND

[0002] Diamonds have long been viewed as the symbol of eternal love and therefore associated with marriage through the use of diamond engagement rings and wedding rings.

[0003] The prior art is replete with jewelry that includes diamonds, such as wedding bands, engagement rings, and earrings. Diamond earrings for a pierced ear typically include a diamond with a metal post attached to the diamond. A metal clasp or back, sometimes referred to as an earnut, retentatively fits over the post to secure the earring to the ear.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] FIG. **1** is a perspective view of a diamond band according to an example embodiment.

[0005] FIG. **2** is a front elevation view of the diamond band of FIG. **1**.

[0006] FIG. **3** is a top view of the diamond band of FIG. **1**.

[0007] FIG. **4** is side view of a portion of a diamond band having facets according to an example embodiment.

[0008] FIG. **5** is a top view of a diamond band having an embedded gemstone according to an example embodiment.

[0009] FIG. **6** is a top view of a diamond band having a gemstone in a setting according to an example embodiment.

[0010] FIG. **7**A is a side elevation block representation of a diamond earring according to an example embodiment.

[0011] FIG. **7**B is a side elevation block representation of an alternative diamond earring according to an example embodiment.

[0012] FIG. **8**A is an exploded perspective view of a diamond earring according to an example embodiment.

[0013] FIG. **8**B is a perspective view of yet a further diamond earring according to an example embodiment.

[0014] FIG. **9** is an enlarged perspective view of an earnut of the earring of FIG. **8**A.

[0015] FIG. **10**A is a side elevation view of a post of the earring of FIG. **8**A.

[0016] FIG. **10**B is a cross section view of a post of the earring of FIG. **8**A.

[0017] FIG. **11** is a top view of a washer of the earring of FIG. **8**A according to an example embodiment.

[0018] FIG. **12** is a top view of an alternative washer of the earring of FIG. **8**A according to an example embodiment.

[0019] FIG. **13** is a top view of an alternative washer of the earring of FIG. **8**A according to an example embodiment.

[0020] FIG. **14** is a top view of an alternative washer of the earring of FIG. **8**A according to an example embodiment.

[0021] FIG. **15** is a top view of an alternative washer of the earring of FIG. **8**A according to an example embodiment.

[0022] FIGS. **16**A, **16**B, **16**C, **16**D, **16**E, and **16**F are top views of various shapes of gemstones having posts according to example embodiments.

[0023] FIG. **17** is a perspective view of a washer and earrnut coupled by a diamond chain according to an example embodiment.

[0024] FIG. **18** is a side view of a post and a side view of a flexible earrnut for coupling to the post according to an example embodiment.

DETAILED DESCRIPTION

[0025] In the following description, reference is made to the accompanying drawings that form a part hereof, and in which is shown by way of illustration specific embodiments which may be practiced. These embodiments are described in sufficient detail to enable those skilled in the art to practice the invention, and it is to be understood that other embodiments may be utilized and that structural, logical and electrical changes may be made without departing from the scope of the present invention. The following description of example embodiments is, therefore, not to be taken in a limited sense, and the scope of the present invention is defined by the appended claims.

[0026] Various items of jewelry may be made from diamond. Some embodiments include a circular band made out of solid diamond. Further embodiments include multiple portions made out of solid diamond to form earrings, chains and other forms of jewelry.

[0027] FIGS. **1**, **2** and **3** show an example diamond band or ring **100**. The band **100** is made of solid diamond in one embodiment, and may form a ring or bracelet. The band may be circular, oval, polygonal, or may be formed as a racetrack type pattern or may consist of various combinations of curved and polygonal portions. In some embodiments, the band may not be continuous, and may have a gap. The band may be worn on a body part, such as finger, wrist, neck, ankle, or other body part.

[0028] The term diamond is used to describe crystallized carbon. The present invention can be made of any of the commonly known types of diamond including the 4 types, known as type **1***a*, **1***b*, **2***a*, and **2***b*.

[0029] Diamond is comprised made mostly of carbon, and can be extremely pure. In almost all diamond material, however, there exists some portion of other elements, interspersed within the carbon as part of their crystal structure. These "impurities" are not what are commonly known as inclusions, visible to the naked eye or via magnification. These impurities are so subtle they may not even be visible under a very powerful microscope. Diamond material used to make the embodiments described herein are likely to contain some amount of other elements, or impurities.

[0030] The presence of other elements or combination of elements in diamond can give the diamond material a colored appearance. Various embodiments may be made out of diamond material having impurities such that it appears colored, including diamond material known as fancy colored diamond.

[0031] Diamond material is available from a number of sources. Diamond material may be mined from the earth or synthesized in a laboratory. Various embodiments may utilize diamond material from any source, as long as that material can be cut into a solid piece of diamond as described herein.

[0032] There are many diamond cutting techniques known in the art. Embodiments may be made utilizing any of the presently known cutting techniques. One of the methods used to create solid diamond jewelry include laser cutting solid diamond shapes out of a sheet of diamond made using a chemical vapor deposition process. Such a sheet of diamond may be formed as a single crystalline sheet using plasma

assisted chemical vapor deposition. In further embodiments, the diamond may be formed by high pressure high temperature methods.

[0033] In one embodiment, the band **100** is substantially circular in shape, with straight sides. It may be cut from a sheet of diamond that is polished flat on both sides of the sheet. The sides of the sheet form the edges of the band **100** as indicated at **110**. The inner edge **115** of the band **100** may be smooth in one embodiment, or may include a series of straight cuts by laser or other cutting device. In one embodiment, a large number of straight cuts may be used to form the inner edge of the ring to avoid potential discomfort of a wearer. In addition, a large number of cuts, such as 500 or more, may appear smooth or perfectly circular to a casual wearer. The inner edge defines a band or ring size, which may be customized to individual wearers in one embodiment.

[0034] An outer edge **120** of the band **100** may also be smooth, or consistent of a series of straight cuts similar to the inner edge **115**. In further embodiments, such as shown in a partial view of a band in FIG. **4**, an outer edge and sides of the band may include one or more facets **410** cut into the band to enhance the amount of light reflected by the band and give the ring the appearance of a cut gemstone. The facets may be formed along some portion or the entirety of the piece of diamond material.

[0035] In one embodiment as shown in FIG. **5**, a diamond band **500** includes, as an integral component, a portion that appears to be a separate gemstone **510**. The gemstone may be formed to appear to be part of the band, extending from the band to feature the gemstone. The gemstone **510** may have any type of cut desired, such as round brilliant, having a base that appears embedded into the band.

[0036] In further embodiment in FIG. **6**, diamond material may be cut to include a setting **610** on a band **600**, to appear as a traditional diamond solitaire engagement ring. The ring **600** appears as a band with a gemstone setting at some point on the band. Many different settings may be cut from the diamond material in various embodiments. The diamond material may be rotated to different angles to accomplish the cuts to form such settings and gemstone combinations. Rings or bands incorporating a gemstone may be smooth or faceted in various embodiments. As shown in FIG. **6**, the band has been cut and/or polished to give it a rounded appearance line a metal ring.

[0037] FIG. **7**A is a perspective view of a diamond earring **700** according to an example embodiment. The diamond earring **700** in one embodiment is formed entirely of diamond. One example earring **700** includes a first portion **705** having a post **710** for insertion into a hole in a body part of a wearer, such as an ear or other portions of the body. A separate clip **720** formed of any desired material may be used to fasten the earring **700** via the post **710**. In a further embodiment illustrated in FIG. **7**B, the post may be curved to form a loop **720** such that the earring may be held in place by gravity.

[0038] In some embodiments, the post **710** is reinforced with another material, such as platinum or gold, or any other material that may provide strength and durability to the post to reduce the chance that the post may break. The reinforcing material may be formed on one or more sides of the post **710**, and may coat the post in some embodiments. The reinforcing material may be deposited on the post using chemical vapor deposition, or in some embodiments, the post **710** may be dipped in a liquid form of the reinforcing material, such as heated metal. Further material may include glass, epoxy, glue, or other material suitable for enhancing the strength and durability of post **710**. Such materials should be compatible with skin contact, and not cause undue skin irritation in some embodiments.

[0039] The first portion **705** may be formed in the shape of a gemstone in one embodiment, and may have a further a second portion **730** formed integral with the first portion **705**. The second portion **730** may be a portion with a distinct design separate from the first portion, or may be of a similar design, but appearing separate from the first portion such that a viewer would not consider them as forming a single gemstone. In one embodiment, the first and second portions may be joined by a rod **735** or other structure between the two portions. A diamond chain may be used as a connecting portion in one embodiment. The rod itself may be considered a portion or joining portion that joins two main portions together. In one embodiment, the portions may appear as separate gemstones or separate design features. In further embodiments, a separate non-diamond, such as metal or plastic clasp for attaching to an ear may be attached to the earring.

[0040] Many further portions may be included, providing the ability to from an infinite number of different shapes of earrings, or other items of jewelry. In some embodiments, portions may be formed of interlocking loops to provide a chain or necklace appearance, and may be worn by a person. The loops may be fixed in relation to each other, or may be separate loops that are moveable relative to each other. The loops may be formed from a plate of diamond, rotating the diamond to form alternate loops, and freeing the loops from each other via one or more laser cuts from various angles. In further embodiments, selected portions of jewelry, such as posts in an earring, may be formed of other material if desired.

[0041] In one embodiment, a portion may be formed in the shape of an animal or insect, or other desired subject, including abstract art. As indicated above, the possibilities for design of a portion or connected portions may be infinite. In one embodiment, the set of designs may be limited by the size and shape of the starting material. When a plate of chemical vapor deposition diamond is used as a starting material, it is a block of diamond from which material is removed to form the jewelry. In one embodiment, if a ring with gemstone feature is being made, the ring will likely be cut primarily from the top of the plate, with an outline of the gemstone feature also being first cut from the top of the plate. In such an embodiment, the gemstone may not be larger than the thickness of the plate. Further, it will have a crystalline orientation that is defined by the crystalline orientation of the plate.

[0042] When a plate of single crystalline chemical vapor deposition diamond is used to form a band or other multi-component jewelry, the components will all have the same crystalline orientation, and may be perfectly matched in terms of color and clarity. Since such plates may be made with various colors, such as pink, blue or yellow, in addition to colorless to near colorless, the matching of the color among the components of the jewelry may provide for striking, all diamond, combinations formed into a wide array of different solid diamond items of jewelry.

[0043] FIG. **8**A is an exploded perspective view of a diamond earring **800** according to an example embodiment. A gemstone **805** is formed with a stud or post **810** shaped to fit through a hole in a pierced body part in one embodiment. The post **810** may be formed integrated with the gemstone **805**. The combined post and gemstone may be formed from the same diamond, such as a plate of CVD formed diamond in

one embodiment. While the gemstone **805** is shown in a setting with prongs, in some embodiments, the gemstone **805** is fully supported and integrated with the post **810** obviating the need for a separate setting with prongs.

[0044] In some embodiments, the post **810** may be coated or otherwise provided with reinforcing material **813** as described above. Various known processes may be used to coat the post with reinforcing materials. In some embodiments, the reinforcing material may at least partially cover a base of the gemstone **805** proximate the post **810**. The reinforcing material may be formed of jewelry grade precious metals to enhance the appearance of the gemstone **805** in some embodiments. Example precious metals include gold, silver and platinum in various purities. The thickness of the reinforcing material may be varied depending on the thickness of the diamond material forming post **810**. The overall diameter of post **810** with coating **813** in some embodiments is consistent with the diameter of standard posts for pierced body parts. In some embodiments, the reinforcing material is a metal coating formed as a threaded portion of the post for mating with an earnut **825** with mating threads, which may also be formed at least partially of metal or other suitable material for providing a post retaining function.

[0045] A diamond decorative washer **815** may be formed from the same CVD formed diamond plate or another plate or mined diamond. The decorative washer is formed with a hole **820** sized to accommodate the post **810**. The post **810** may be inserted through the hole **820**, and secured to the body part by an earnut **825**. Gemstone **805** is formed large enough to prevent the washer **815** from slipping over the gemstone **805**, such that the washer is secured **815** between the gemstone **805** and a body part when properly installed with the earnut **825**. In one embodiment, the post **810** when attached to earnut **825** via mating threads, mating notches and protrusions, or other structures formed in diamond form a diamond upon diamond connective bond to secure the earring **800** to a selected body part. When inserted through an earlobe, the gemstone **805** and washer **815** may be situated on an outside part of the earlobe, with the post **810** extending through the earlobe and secured on the other side of the earlobe to the earnut **825**. In this manner, the gemstone **805** and washer **815** form a decorative portion of the earring **800** that is visible to others.

[0046] In further embodiments, the reinforcing material may be formed on other portions of the diamond material in various forms, such as ring, washer, earnut, and earring to name a few. The reinforcing material may be used to strengthen the diamond structures, and may also be strategically positioned on selected portions or surfaces of the diamond material to enhance the appearance of the diamond when worn on an intended body part. For instance, the inner surface of a ring formed of diamond may be coated with platinum, as indicated at **615** in FIG. **6**, to enhance the visibility and light reflecting properties of the ring.

[0047] FIG. **8**B is a perspective view of a further gemstone **830** and post **835** arrangement. In one embodiment, the gemstone **830** is formed in a rain drop shape, with the post **835** extending from a top of the rain drop shape. The gemstone **830** and post **835** may be formed from a single piece of diamond in one embodiment, such that the post is integrated with the gemstone. Many different shapes of gemstones may similarly be formed with an integrated post, and may have one or more faceted portions.

[0048] In one embodiment, post **835** may be formed of a metal such as platinum, with the gemstone formed around the metal. The post may be formed first, and then coated with a diamond seed material, and the gemstone grown around the post using plasma assisted chemical vapor deposition techniques. The gemstone may then be cut into various shapes, such as by laser and polished as desired. In further embodiments, the rain drop shape may also have facets. In one embodiment, the entire metal post is covered with grown diamond.

[0049] The post **835** may be inserted through a washer of various shapes, such as a snowflake shape, and have threads or other attachment mechanisms to mate on the other side of a body part, such as a earlobe, with a suitable earnut **825**, which may or may not also be formed of diamond, or metal, or diamond coated metal in various embodiments.

[0050] In further embodiments, the gemstones, posts and washers may be formed of different colored diamond that may form a set that can be mixed and matched to obtain a desired aesthetic appearance.

[0051] FIG. **9** is an enlarged perspective view of earnut **825**. In one embodiment, earnut **825** is formed of diamond, and has an opening **910** to engage with the post **810**. The opening **910** may be formed with threads **915**, to engage with mating threads as indicated on post **810** in FIG. **10**A, which is a side elevation view of post **810**. Threads **915** may be formed by cutting via sawing or laser cutting. When formed via laser, the earnut **825** or laser is rotated, allowing the cutting of the threads from one or both sides of the earnut **825**. In one embodiment, one, two or more complete or partially complete threads may be used to provide retention of the post when suitably engaged with mating thread **1005** on post **810**. The threads **1005** may be formed in a similar manner to threads **915**. In further embodiments, clasps like clip **720** may be used to retain the earring **800** in place when worn. A loop may also be used without an earrnut in further embodiments.

[0052] In further embodiments, earnut **825** may be formed of a different material such as metal, or diamond reinforced with metal to increase its strength and ability to hold the post securely. FIG. **10**B is a cross section showing post **810** with optional coating **813**.

[0053] FIG. **11** is a top view of a washer **1100** of the earring of FIG. **8** according to an example embodiment. Washer **1100** may be formed of diamond in one embodiment as described above. Washer **1100** has a hole **1110** for accommodating the post **810**. In one embodiment, washer **1100** may be formed in a circular shape with multiple facets to provide for internal reflection of light. Washer **1100** may take many different shapes and designs, rivaling the number of different shapes of snowflakes. As indicated above, washer **1100** may also be at least partially coated with metal to enhance its strength and light reflecting properties.

[0054] When CVD plates are used to form the earring **800**, including washer **1100**, the plates may be fairly large plates, exceeding several centimeters on a side, and have a depth that is suitable for forming round brilliant cut diamonds of several carats in various examples. The depth is expected to increase over time, but currently, the length and width of the plates is expected to exceed the depth for the foreseeable future. Washers having lateral dimensions exceeding 1 cm, 2 cm, 3 cms, or larger may be formed.

[0055] The inventors recognized an inherent limit in the ability to form jewelry from such plates, as at least one of three dimensions is somewhat limited. However, the use of a washer, such as washer **1100** expands the ability to create earrings having large surface areas. Such large surface areas

that are essentially perpendicular to the gemstone portion of the earring provide unlimited design opportunities that can be striking in appearance due in part to their size when viewed from selected angles.

[0056] The washers may be cut in many different patterns as shown in the following FIGS. **12**, **13**, **14** and **15** at **1200**, **1300**, **1400** and **1500** respectively. Each washer contains a suitable hold for engaging with the post, and being retained by the gemstone. Facets may be cut into the washer to provide reflection of light and enhance the appearance as desired.

[0057] Washer **1200** has a circular center portion **1205** with multiple cross shapes **1210** cut from a CVD plate of diamond. The entire structure may be formed of single crystal diamond in one embodiment. Washer **1300** may be formed with a square shaped central portion with further intersecting square shapes. Washer **1400** may be formed as an equilateral triangle. These washers may take many geometric forms, such as polygons, and may also include curved portions as illustrated by washer **1500**. These are just a few examples of the designs of washers that may be utilized in the earring **800**. In some embodiment, multiple washers of varying sizes may be used on the same post **810** to provide even larger appearing diamond earrings. Facets may be used in any of the washers to enhance the use of light to increase and enhance the visibility and appearance of the washers.

[0058] FIGS. **16**A, **16**B, **16**C, **16**D, **16**E, and **16**F are top views of various shapes of gemstones having posts according to example embodiments. A round shape is illustrated at **1610**. Each of the gemstones illustrated may have multiple facets. A pear shape is illustrated at **1620**, a heart shape at **1630**, an oval shape at **1640**, a marquis shape at **1650**, and a princess shape is shown at **1660**. Further shapes and cuts may be used in further embodiments. In further embodiments, the posts may be formed of diamond with integral settings for attaching one or more gemstones that may be independently cut and set in the settings. Such gemstones may be any type of precious or semi-precious gemstone as desired.

[0059] FIG. **17** is a perspective view of a washer **1710** and earrnut **1715** coupled by a diamond chain **1720** according to an example embodiment. In one embodiment, the washer, earnut and chain are formed from the same piece of diamond, resulting in them all being integral to each other. They all have the same crystalline orientation, color, and clarity in one embodiment when formed from the same piece of CVD formed diamond. In one embodiment, a reinforcing layer **725** has been added to the diamond washer **1710**. The reinforcing layer may help strengthen the diamond washer and enhance the visibility of the washer. In further embodiments, links of the chain **1720** may be reinforced with metal or may be formed of metal.

[0060] FIG. **18** is a side view of a post **1810** and a side view of a flexible earrnut **1820** for coupling to the post according to an example embodiment. In one embodiment, the post has an annular groove **1825** near an end opposite the gemstone, not shown. The flexible earnut **1820** has a hole **1830** that is sized to expand over the end of the post and engage securely in the groove **1825**. The earnut **1820** has an outer perimeter that is sized to retain the post on a body part, while the other end of the post has a gemstone supports at least one washer formed of diamond. As with other embodiments described herein, each of the components of the earring may be formed of diamond.

[0061] This invention is intended to cover all changes and modifications of the example embodiments described herein which do not constitute departures from the scope of the claims.

What is claimed is:

1. An article comprising:

a post formed of diamond;

a gemstone integrally formed with the post; and

a washer formed of diamond having a hole for being supported by the post such that the washer is held between the gemstone and a body part when worn on the body part.

2. The article of claim **1** and further comprising an earnut to couple to the post.

3. The article of claim **2** wherein the earnut and post include mating threads.

4. The article of claim **2** wherein the post includes an annular groove and wherein the earnut has a flexible opening to retentively mate with the annular groove of the post.

5. The article of claim **1** wherein the washer has a diameter of at least 2 cm.

6. The article of claim **1** wherein the washer is formed of single crystalline CVD diamond.

7. The article of claim **1** wherein the washer is formed of CVD colored diamond.

8. The article of claim **1** wherein the washer includes multiple facets.

9. The article of claim **1** wherein the washer is polygonal in shape.

10. The article of claim **1** wherein the gemstone and post comprise single crystalline diamond having the same crystal orientation.

11. The article of claim **10** wherein the gemstone and post have the same color and clarity.

12. The article of claim **10** wherein the gemstone, post and washer have the same color and clarity.

13. The article of claim **10** wherein the post includes a reinforcing material.

14. The article of claim **13** wherein the reinforcing material is a metal coating an outside surface of the post.

15. The article of claim **14** wherein the metal coating is formed as a threaded portion of the post for mating with an earnut with mating threads.

16. The article of claim **15** wherein the earnut includes metal.

17. The article of claim **1** wherein the washer includes a partial metal coating.

18. An article comprising:

a post formed of diamond having integral prongs adapted to secure a gemstone; and

a washer formed of diamond having a hole for being supported by the post such that the washer is held between the prongs and a body part when the post is inserted through a hole in the body part.

19. The article of claim **18** and further comprising an earnut to couple to the post.

20. The article of claim **19** wherein the earnut and post include mating threads.

21. The article of claim **19** and further comprising a diamond chain coupled between the washer and the earnut.

22. The article of claim **18** wherein the washer has a diameter of at least 2 cm.

23. The article of claim **18** wherein the washer is formed of single crystalline CVD diamond.

24. The article of claim **18** wherein the washer is formed of CVD colored diamond.

25. The article of claim **18** wherein the washer includes multiple facets.

26. The article of claim **18** wherein the post and washer have the same color and clarity.

27. The article of claim **18** wherein the post includes a reinforcing material.

28. The article of claim **27** wherein the reinforcing material is a metal coating formed as a threaded portion of the post for mating with an earnut with mating threads.

29. The article of claim **18** wherein the washer includes a partial metal coating.

30. A method comprising:

forming a gemstone with integral post from a CVD formed diamond plate;

forming a washer from a CVD formed diamond plate, the washer formed with a hole adapted to engage the post; and

forming a feature on the post to couple to a retentive earnut.

31. The method of claim **30** wherein the gemstone with post and washer are cut from the same CVD formed diamond plate by use of a laser.

32. The method of claim **30** and further comprising forming multiple facets on the washer.

33. The method of claim **30** and further comprising cutting a featured gemstone as an integral part of the band from the plate of diamond.

34. The method of claim **30** wherein the post is formed to include a non-diamond reinforcing material.

35. A method comprising:

forming a first component from a plate of diamond; and

forming a second component integrally coupled to the first component from the plate of diamond.

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